

MATHEMATICS 360-255-LW

Quantitative Methods II

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II – Counting

1. At a restaurant, you can choose from seven main dishes and 15 side dishes. In how many ways could you select one main dish and one side dish?
2. At a restaurant, you can choose from either 12 types of pizza or 9 types of pasta. In how many ways could you select one dish?
3. A pizza parlor has 4 types of crust and 12 different pizza toppings. In how many ways could you order a one-topping pizza?
4. A math instructor gives a weekly multiple choice quiz. There are five questions, and each question has four possible answers, of which only one is correct.
 - a) In how many different ways could a student answer the five questions?
 - b) In how many different ways could a student answer all five questions correctly?
 - c) In how many different ways could a student answer all five questions incorrectly?
 - d) What is the probability of a student answering all five questions incorrectly?
5. Bruce Springsteen has released 16 CDs. In how many different ways could a fan select three of his CDs to bring on a road trip?
6. An exam consist of eight multiple choice questions, each with four possible answers, and five true or false questions. In how many ways can a student answer the exam?
7. An exam consist of five multiple choice questions, each with four possible answers, three multiple choice, each with five possible answers, and four multiple choice, each with three answers. In how many ways can a student answer the exam?
8. Twenty children sign up to test a new medication. In how many different ways could the doctors select eight of the children to receive the medication?
9. A pizza parlor has 12 different pizza toppings. In how many ways could you choose three pizza toppings?
10. In how many ways can five people sit on a row of five chairs?
11. In how many ways can five people sit around a round table with five chairs?
12. Seven people arrive at the ticket counter of a cinema at the same time. In how many ways can they line up to purchase their tickets?

13. A doctor has time to see four more patients before his shift ends and an other doctor replaces him. If there are twelve people waiting, then in how many ways can the receptionist fill the doctor's four appointments?
14. In how many ways can the letters of the following words be rearranged to form a different word?
- | | |
|-------------------|----------------|
| a) MATHEMATICS | b) MISSISSIPPI |
| c) RECONSTRUCTION | d) PHOTOGRAPHY |
15. Six students, of which three are girls and three are boys, sit on a row of chairs.
- In how many ways can they sit themselves?
 - In how many ways can they sit themselves if the girls and the boys each sit together?
 - In how many ways can they sit themselves if no two boys and no two girls sit beside one another?
16. The Emergency Room at the CHUL employs eight male and ten female nurses. A special triage unit of six nurses is being formed. In how many different ways can this be done if
- the unit must have only female nurses on it.
 - the unit must have only male nurses on it.
 - the unit must have two male nurses and four female nurses on it.
 - the unit must have three male nurses and three female nurses on it.
 - the unit must have at least one female nurse on it?
17. How many different worker-management health committees can be formed from a total of 15 different workers and seven management personnel if each committee is to consist of five workers and four management personnel?
18. A committee of four, with a president, vice-president, treasurer and secretary is to be made from a pool of 18 candidates, 12 of which are men. In how many ways can this be done if the committee is to have
- only men on it.
 - only women on it.
 - only men or only women
 - exactly one men
19. A committee of four is to be made from a pool of 18 candidates, 12 of which are men. In how many ways can this be done if the committee is to have
- only men on it.
 - only women on it.
 - only men or only women
 - exactly one men

20. A box contains eight green marbles, five blue marbles, three red marbles and three yellow marbles. If four marbles are chosen at random, in how many ways can they be chosen if
- a) they are all green
 - b) one is green and three are red
 - c) there is one from each color
 - d) there are no yellow marbles
 - e) the marbles are blue and green only
21. You are asked to form two work groups, one with five members and the other one with four, all chosen from a pool of fifteen candidates. In how many ways can this be done?
22. You are asked to select a committee of four from a pool of 10 candidates. In how many ways can this be done if two of the candidates will only sit on the committee if they are together?
23. A poker hand is a subset of five cards drawn from a pack of fifty-two cards. If five cards are selected at random, what is the probability that the poker hand will
- a) contain only hearts?
 - b) have exactly two kings?
 - c) have at least three kings?
 - d) have exactly three of a kind?
 - e) have three of a kind and a pair (a full-house)?
24. (*Optional: more challenging*) A telephone number has 7 digits and may not begin with 0 or 1 with the following restrictions.
- a) How many telephone numbers are there?
 - b) How many telephone numbers with exactly 3 twos and no other repeated digits?
 - c) How many telephone numbers with exactly 3 ones and no other repeated digits?
 - d) How many telephone numbers with 3 twos and 2 threes and two other different digits?
 - e) How many telephone numbers with 3 twos and 2 ones and two other different digits?
 - f) How many telephone numbers with at least 5 twos?

ANSWERS

1. 105
2. 21
3. 48
4. a) 1024 b) 1 c) 243 d) $\frac{243}{1024}$
5. 560
6. 2 097 152
7. 10 368 000
8. 125 970
9. 220
10. 120
11. 24
12. 5040
13. 11 880
14. a) 4 989 600 b) 34 650 c) 2 724 321 600 d) 4 989 600
15. a) 720 b) 72 c) 72
16. a) 210 b) 28 c) 5880 d) 6720 e) 18 536
17. 105 105
18. a) 11880 b) 360 c) 12240 d) 5760
19. a) 495 b) 15 c) 510 d) 240
20. a) 70 b) 8 c) 360 d) 1820 e) 715
21. 630 630
22. 98
23. a) $\frac{33}{66640}$ b) $\frac{2162}{54145}$ c) $\frac{19}{10829}$ d) $\frac{88}{4165}$ e) $\frac{6}{4165}$
24. a) 8 000 000 b) 92 400 c) 53 760 d) 10 920 e) 7980 f) 1478